

On the Homogenization of a Damped Wave Equation

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The effective behavior of the solution of a wave equation with interior and boundary damping, defined in a periodically perforated medium, is analyzed.

We deal, at the microscale, with an ε -periodic structure obtained by removing from a bounded connected open set Ω in \mathbb{R}^n a number of closed subsets of characteristic size ε . As a result, we obtain a perforated domain Ω^ε , in which we consider a wave equation, with interior sources and damping and with dynamic boundary conditions imposed on the boundaries of the perforations.

Assuming suitable initial conditions, we prove that the asymptotic behavior, as the small parameter ε which characterizes the size of the perforations tends to zero, of the solution of such a problem is governed by a parabolic equation, defined on the entire domain Ω .

Key words: homogenization, wave equation, damping and source terms.

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